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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



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| Applicant's or agent's file reference MKCP/P12961PC | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416) | |
| International application No. PCT/GB 03/02599 | International filing date (day/month/year) 17.06.2003 | Priority date (day/month/year) 17.06.2002 |
| International Patent Classification (IPC) or both national classification and IPC G01R31/00 | | |
| Applicant UNIVERSITY OF STRATHCLYDE et al. | | |

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 6 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

 These annexes consist of a total of sheets.

- This report contains indications relating to the following items:
 - I ☒ Basis of the opinion
 - II ☐ Priority
 - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - IV ☒ Lack of unity of invention
 - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - VI ☐ Certain documents cited
 - VII ☐ Certain defects in the international application
 - VIII ☐ Certain observations on the international application

| | |
|---|--|
| Date of submission of the demand 15.01.2004 | Date of completion of this report 02.11.2004 |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | Authorized Officer Böhm-Pélissier, A Telephone No. +49 89 2399-2495  |

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/GB 03/02599

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-45 as originally filed

Claims, Numbers

1-55 as originally filed

Drawings, Sheets

1/13-13/13 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

IV. Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees, the applicant has:

- ☐ restricted the claims.
☐ paid additional fees.
☐ paid additional fees under protest.
☒ neither restricted nor paid additional fees.

2. ☒ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is

- ☐ complied with.
☐ not complied with for the following reasons:

4. Consequently, the following parts of the international application were the subject of international preliminary examination in establishing this report:

- ☐ all parts.
☒ the parts relating to claims Nos. 1-34, 47-50 .

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|---------------------------------------|
| Novelty (N) | Yes: Claims | 14,15 |
| | No: Claims | 1,2,12,16,17,20,21,23,24, 34, 47 (no) |
| Inventive step (IS) | Yes: Claims | 14,15 |
| | No: Claims | 3-11,13,18,19,22,25-33,48-50 (no) |
| Industrial applicability (IA) | Yes: Claims | 1-50 |
| | No: Claims | |

2. Citations and explanations

see separate sheet

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EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB 03/02599

1. Citations:

D1: XP2265465

D2: XP10094549 (incorporated by reference in D1)

D3: XP636623

D4: XP636621

2. Re-Item IV): Lack of unity of invention

The separate inventions are:

A.) Claims 1-34, 47-50

These claims are related to a method/apparatus for generating digital test inputs for an analog circuit by using an optimisation algorithm.

B) Claims 35-46, 51-55

These claims relate to a method/apparatus for testing an analog circuit by means of an optimised digital input signal for determining a fault.

These inventions are not so linked as to form a single general inventive concept (Rule 13.1 PCT) for the following reasons:

The only common technical feature linking the two groups of inventions is an optimised digital input signal. It is well-known to optimise a digital input for generating a test input signal and using an optimised digital input signal for testing an analog circuit (cf., e.g. D1).

Therefore, this common technical feature cannot be considered as common inventive concept.

Since no additional fees were paid, only Claims 1-34 and 47-50 are subject of this written opinion.

Re-Item V):

3. Articles 33 (1) and (2) PCT (novelty)

3.1 (independent) claims 1, 24, 34, 47:

D1, which is considered to represent the closest prior art, discloses a method/an apparatus for digital testing of an analog circuit by optimising a (digital) input signal by comparing the digital outputs from a fault free and a faulty circuit; cf. abstract,

sections 1, 2.3, 2.4, 3.

The method of fault modelling and test generation for analog circuits comprises monitoring the corresponding outputs (cf. Figs. 6, 9) and optimising the (digital) input parameters by varying the signal parameters (cf. example in section 3, genetic algorithm-based test generator, cf. D2 Figs. 1, 2, 6, page 217, column 1).

Comment: The analog signal is transformed into a digital test vector for test simulation/generation. The digital test vector is the test input for the test simulation for (digital) test vector optimisation. The optimised digital test vector is then converted into an analog signal.

The following dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty, the reasons being as follows:

- | | | |
|-----|--------------------------------------|--|
| 3.2 | <u>Claims 2, 16, 20, 21, 23, 48:</u> | cf. paragraph 3.1, above. |
| 3.3 | <u>Claim 12:</u> | cf. D1, section 2.4. |
| 3.4 | <u>Claim 17:</u> | cf. Table I in D2, which describes the genetic-based test generator used for the above-described method/apparatus. |

Consequently, the subject-matter of the claims 1, 2, 12, 16, 17, 20, 21, 23, 24, 34 and 47 is not novel.

4. Articles 33 (1) and (3) PCT (inventive step)

The following claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, because their subject matter is either disclosed in or rendered obvious by the indicated passages:

- | | | |
|-----|-----------------------------|--|
| 4.1 | <u>Claims 3, 18, 19:</u> | cf. D3, paragraph 5.2.1., Fig. 6. |
| 4.2 | <u>Claims 4-8:</u> | Iteratively varying the input parameters by the same value is obvious in view of paragraph 3.1. |
| 4.3 | <u>Claims 9-11, 13, 22:</u> | cf. in D4 the test point optimisation algorithm with iterative improvement similar to the hill climbing algorithm. The "pattern shift function" consists in replacing/permuting rows |

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EXAMINATION REPORT - SEPARATE SHEET**

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- in a matrix system (D4, section 4.1.); the optimal set of test points (cf. D4, section 4.2.) represents a local optimum.
- 4.4 Claims 25-30: cf. corresponding claims 2-7, 18.
4.5 Claims 31-33: cf. D1, Fig. 9, cf. Table I in D2.
4.6 Claims 48-50: cf corresponding claims 2-5.

Consequently, the subject-matter of the claims 3-11, 13, 18, 19, 22, 25-33 and 48-50 is not inventive.

5. Outlook

- Claims 14 and 15 seem to be compliant with Article 33 PCT.
- Claim 55 in combination with the technical features of claim 2 may lead to a claim compliant with Article 33 PCT.